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SUBJECT: Forwards Relief Request RR3-1 to allow performance of temporary noncode repair on ASME Code Class 3 svc water sys, per 920828 telcon w/NRC. Isolation of Train B svc water header, to perform code-qualified repair, impractical.

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September 1, 1992

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555

Gentlemen:

Docket 50-305
Operating License DPR-43
Kewaunee Nuclear Power Plant
Relief Request No. RR3-1 for Performing a Temporary
Non-Code Repair on the ASME Code Class 3 Service Water System

The purpose of this letter is to submit relief request No. RR3-1 to allow performing a temporary non-code repair on the ASME Code Class 3 Service Water (SW) System at the Kewaunee Nuclear Power Plant. The relief request is provided in Attachment 1.

During normal 100% power operation, leakage was detected on valve SW-800B. Valve SW-800B, as shown on the figure in Attachment 2, is the first isolation valve off the "B" SW 16" diameter header that supports "B" train engineered safety features (ESF) equipment. Several options to repair SW-800B were evaluated by the plant staff. A summary of the various repair options is provided in the attached relief request. The conclusion reached is that it was impractical to isolate the "B" train SW header to perform a code-qualified repair during plant operation. Management concluded that it was in the best interest of plant safety to perform a temporary non-code repair. The proposed temporary repair consisted of clamping a canister to each side of the valve, thus encasing the valve and ensuring structural integrity.

The need for the relief request and the proposed temporary repair were discussed with the Nuclear Regulatory Commission (NRC) staff in a series of telephone conferences on August 28, 1992. Following these conversations, the NRC staff informed Wisconsin Public Service Corporation (WPSC) that they agreed it was safe to continue to operate the plant, it would be prudent to immediately install the canister as proposed with the understanding it would have to be removed if subsequent NRC staff review did not find the design acceptable, and we should prepare and submit the relief request by September 1, 1992. The proposed temporary modification is discussed in the relief request and a sketch is provided in Attachment 3.

A001
1/1

Additionally, WPSC commits to take the following actions:

-- If a plant shutdown or trip occurs prior to the next scheduled refueling outage, a code-qualified repair will be performed.

-- The downstream solenoid valve will be maintained open until a code-qualified repair is performed to prevent any additional fatigue.

-- An augmented leakage inspection program will be implemented; if leakage in excess of 1 gpm is observed, operability of the 1B auxiliary building basement fancoil unit and the SW header will be assessed and appropriate actions taken.

-- The root cause of the failure and generic implications will be determined with appropriate corrective actions implemented prior to the end of the 1993 refueling outage.

The Plant Operations Review Committee reviewed the canister design and installation procedure following discussions with the NRC staff on August 28, 1992. The canister was installed later that evening.

We appreciate the staff's responsiveness and support of our request on August 28. If there are any questions or you require additional information, please contact me or a member of my staff.

Sincerely,

C. A. Schrock

C. A. Schrock
Manager - Nuclear Engineering

SLB/jms

Attach.

cc - US NRC - Region III
Mr. Patrick Castleman, US NRC

g:\wpfiles\RR3-1

ATTACHMENT 1

To

Letter from C. A. Schrock (WPSC)

To

Document Control Desk (NRC)

Dated

September 1, 1992

Relief Request
RR3-1

Relief Request No. RR 3-1

1. Components Affected

Service Water System pressure boundary:

Identification	Flow Diagram	Description
SW-800B	M202 sheet 2 and M606	1 1/2" Diameter Ball Valve

The Service Water System has a design temperature of 100°F and a design pressure of 125 psig. The system operates at the temperature of Lake Michigan, approximately 33-70°F, and at 90 psig.

Service water valve SW-800B is the first isolation valve off the "B" train service water 16" diameter header for the branch line which provides flow to the 1B auxiliary building basement fancoil unit. This area of the auxiliary building basement is designed not to exceed 120°F under postaccident conditions, when the normal ventilation system is unavailable. The maximum allowable temperature is based on continued operation of safeguards electrical equipment. The 1B auxiliary building basement fancoil unit is one of four fancoil units installed in the auxiliary building basement to prevent excessively high ambient air temperatures in the event of a zone SV actuation or a normal ventilation system failure. Each train of service water supplies two auxiliary building basement fancoil units. Each train of fancoil units is redundant; one train is capable of handling the required heat load in the event of failure of the other.

Valve SW-800B establishes the boundary between the Section XI portion of the system and the non-code class portion. The threaded connection to this valve has degraded allowing leakage. The plant is currently operating at 100% power. To implement a Section XI qualified repair, this portion of the Service Water System must be isolated and drained. As described in Section 3, "Basis for Requesting Relief," isolating the "B" service water train is impractical without a plant shutdown.

A temporary non-code repair is proposed to limit leakage until the plant is shut down for refueling when a code-qualified repair will be performed. If the plant is shut down prior to the Spring 1993 refueling outage, the "B" train service water header will be isolated and a code-qualified repair will be performed at that time.

2. Section XI Requirements

Repair and replacement requirements are specified in Articles IWD-4000 and IWD-7000 of Section XI. These articles require the use of materials and a design that conforms to the original design specification of Section III. Furthermore, the flaw would have to be removed prior to the repair. Following repair/replacement by welding, the affected joints and the new pressure boundary would be subject to hydrostatic pressure testing at 1.10 times design pressure. To implement the temporary non-code repair of the Class 3 Service Water System as described in Section 4, "Proposed Temporary Repair," Wisconsin Public Service Corporation seeks relief from the requirements of Articles IWD-4000 and IWD-7000 of the 1980 Edition through Winter 1981 Addenda of Section XI.

3. Basis for Requesting Relief

Due to the design of the Service Water System, a Section XI code-qualified repair is impractical at power without increasing the potential of challenging plant safety as explained herein.

KNPP Technical Specifications, Section 3.3.e, defines the limiting conditions for operation of the Service Water System. This Technical Specification is cited below:

T.S. 3.3.e Service Water System

1. The reactor shall not be made critical unless the following conditions are satisfied, except for low-power physics tests and except as provided by Specification 3.3.e.2.

   A. TWO service water trains are operable with each train consisting of:

      1. TWO service water pumps

      2. An operable flow path consisting of all valves and piping associated with the above train of components and required to function during accident conditions. This flow path shall be capable of taking a suction from the forebay and supplying water to the redundant safeguards headers.

   B. The forebay water level trip system is operable.

2. During power operation or recovery from an inadvertent trip, ONE service water train may be inoperable for a period of 72 hours. If operability is not restored within 72 hours, then within 1 hour action shall be initiated to:

   - Achieve Hot Standby within the next 6 hours.
   - Achieve Hot Shutdown within the following 6 hours.
   - Achieve and maintain Reactor Coolant System T_{avg} less than 350°F by use of alternate heat removal methods within an additional 36 hours.

A summary of the repair options considered includes:

1) Closing valve SW-800B and tightening the threads on the non-code class portion of the valve,
2) Closing valve SW-800B and tightening the threads on the code class portion of the valve,
3) Isolating the "B" train service water header and effecting a code-qualified repair,
4) Shutting down the plant and effecting a code-qualified repair, and
5) Installation of a clamped enclosure as a proposed temporary repair.

Because the valve is threaded in place, tightening the threads on the upstream side of the valve has the effect of loosening the threads on the downstream side of the valve and vice versa. This approach was initially attempted; however, to prevent a catastrophic failure of the threads, this approach was abandoned.

Isolating the "B" train service water header at power to perform a code-qualified repair was given much consideration. To isolate, drain the "B" service water header, make a code-qualified repair, perform the hydrostatic pressure test, and return the train to service is estimated to require a minimum of 36 hours. This renders one complete train of ESF equipment supported by service water inoperable, including:

Aux Feedwater (FW) Pump 1B
Component Cooling Water Heat Exchanger 1B
Safety Injection Pump Lube Oil Cooler 1B
Containment Fancoil Units (FCU) 1C and 1D
Turbine Building Basement FCU 1B
Aux Building Basement FCU's 1B and 1D
Train B Control Room Air Conditioners
RHR Pump Pit FCU 1B
Component Cooling Pump 1B FCU
Train B Fan Floor FCU, and

The 1B Aux Building Mezzanine Floor FCU

Note: The two inoperable containment fancoil units supplied by the "B" service water train represents a challenge to plant safety in that they provide the only cooling to the "A" reactor coolant pump (RXCP) vault.

Westinghouse Electric Corporation estimates that once cooling air is lost to the RXCP vault, the RXCP motor will overheat within 5-10 minutes. Although forced air flow would still be available to the 1A RXCP vault, the ability to cool the vault would be greatly degraded since it would only be the circulation of ambient air, not cooled air. KNPP does not have an analysis of the effectiveness of ambient air to cool the RXCP motor and time to start overheating the RXCP. However, based on our engineering judgement, we feel the RXCP motor could overheat in as little as one operating shift. As previously stated, a code-qualified repair has been estimated to take a minimum of 36 hours. Once the temperature of the RXCP motor windings reach 155° C, the RXCP must be manually tripped by plant operating procedure N-RC-36A, also resulting in a reactor trip.

Removing the "B" train of service water from service at power places the plant at a greater risk level. This was verified using the KNPP Individual Plant Examination (IPE). The IPE results indicate that there would be a four-fold increase in overall core damage frequency if the "B" train of service water was unavailable.

The effect of service water leakage from this valve on plant operations and nearby equipment was considered. External leakage from this valve does not affect plant safety because:

1) No safety-related components are located directly beneath this valve,

2) The "B" service water train has sufficient capacity to perform its function (excluding the 1B auxiliary building basement fancoil unit) even if a double-guillotine break at the valve were to occur, and

3) To ensure operability of the 1B auxiliary building basement fancoil unit, KNPP has the ability to monitor performance of the fancoil unit.

A plant shutdown to perform a code-qualified repair at this time is undesirable and impractical, because of the resultant undue and unnecessary stress on facility systems and components. After considering several repair options, KNPP management has concluded that a temporary repair by encapsulating the service water pipe and valve is in the best interest of plant safety.

4. Proposed Temporary Repair

The proposed temporary repair consists of clamping a water-tight enclosure around the valve. This repair is considered a stop gap measure; an inservice pressure test will be performed to validate the water-tight design. Any leakage will be reconciled with system performance requirements or an alternative design will be submitted for NRC review. The effect of the canister will be to act as a new pressure boundary.

The canister, fabricated from 6" diameter Schedule 80 carbon steel pipe and 1/2" thick carbon steel plate, is designed with an independent support so as to not increase the weight on the Service Water System. Consideration of the following loads were included in the design of the temporary repair; seismic, dead weight, thermal, and pressure. The temporary repair assumes a double-guillotine break at the valve. The desigu of the temporary repair (i.e., stiffness of the canister, additional support, and piping geometry) ensures integrity of the canister/piping interface in the event of a double-guillotine break at the valve.

The design also employs a temporary leak collection system to capture and control any leakage that would result from failure of the valve inside of the canister. Plant safety is not affected by leakage from valve SW-800B, because no safety-related components are located directly beneath the valve and any leakage will be collected and controlled.

A drain valve at the bottom of the canister allows leakage monitoring. As long as leakage has no adverse impact on the function of the system, the drain valve will be maintained in the open position to allow leakage monitoring without accumulating additional fatigue caused by opening and closing of the drain valve. Leakage monitoring will provide information to evaluate the rate and extent of degradation, should remedial repair measures be required.

The initial root cause of the failure was classified as fatigue caused by the cycling of a downstream solenoid valve. As part of this temporary repair, the Section XI ASME Boiler and Pressure Vessel Code Class Boundary will be temporarily moved to the next valve (i.e., SW-801B). This piping valve extension are classified as QA-1 safety-related components. Furthermore, the solenoid valve of interest will be maintained in the open position to eliminate any additional fatigue.

Following effect of the temporary repair, the Operations Department will monitor the canister for evidence of leakage each shift, and a VT-2 visual examination will be performed weekly to ensure integrity of the temporary repair.

Should leakage from SW-800B increase, KNPP staff has the ability to monitor the performance of the 1B auxiliary building basement fancoil unit. If the 1B auxiliary building basement fancoil unit cannot perform its design function, the plant staff will take actions in accordance with applicable plant operating procedures.

ATTACHMENT 2

To

Letter from C. A. Schrock (WPSC)

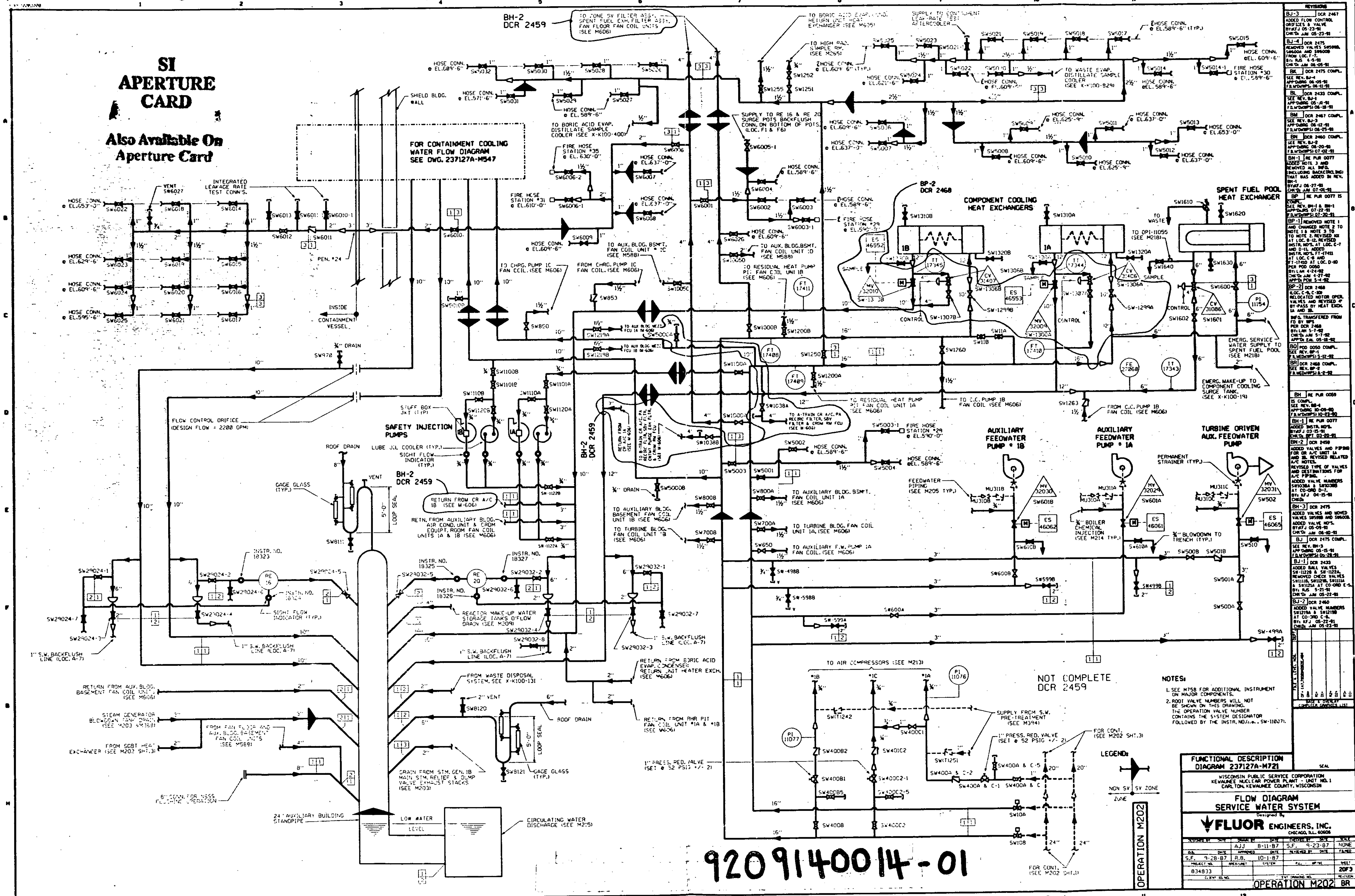
To

Document Control Desk (NRC)

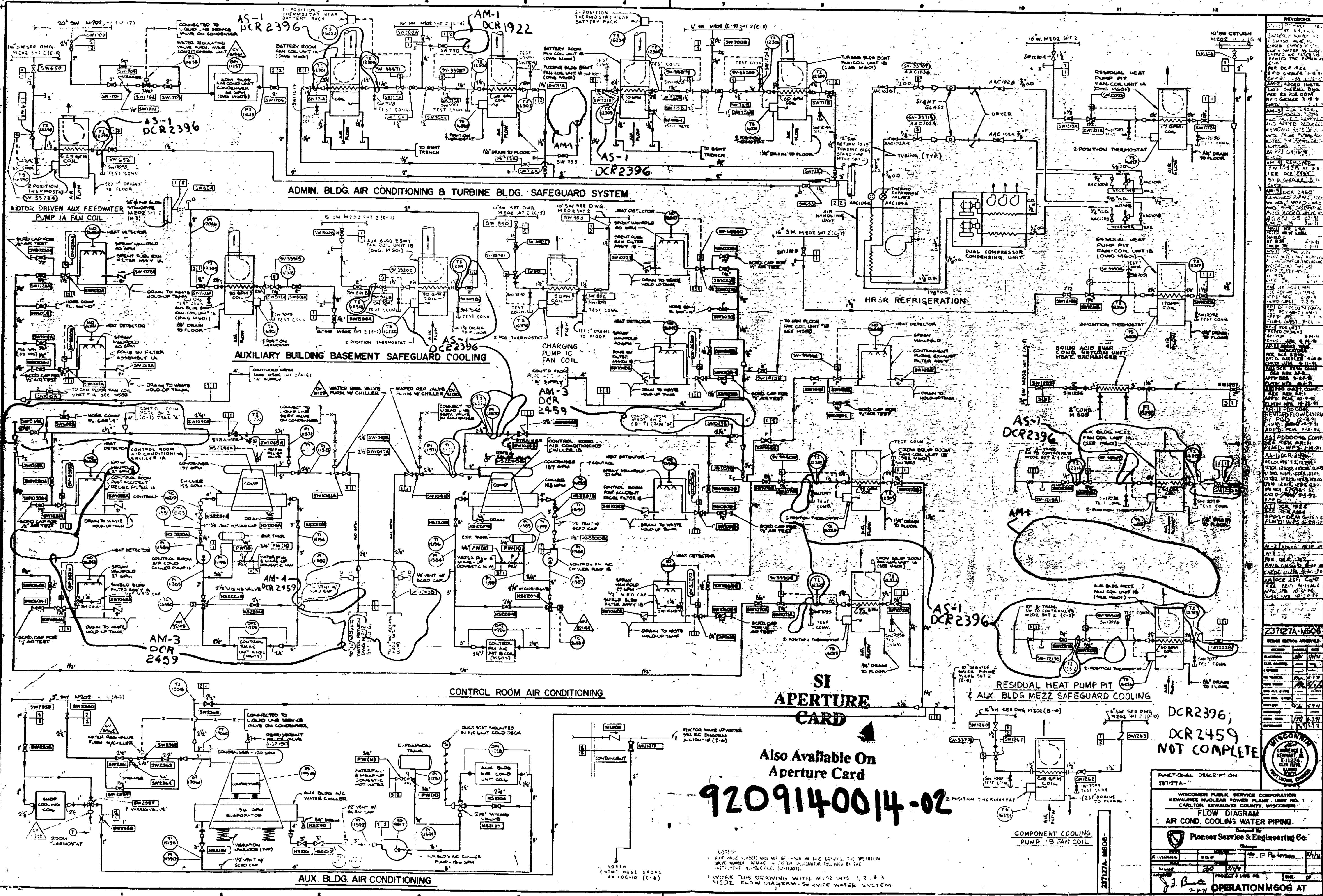
Dated

September 1, 1992

P&IDs M202, Sh 2
M606



SI
APERTURE
CARD
Also Available On
Aperture Card
FOR CONTAINMENT COOLING WATER FLOW DIAGRAM SEE DWG. 237127A-M547
BH-2
DCR 2459
BP-2
DCR 2468
COMPONENT COOLING HEAT EXCHANGERS
SPENT FUEL POOL HEAT EXCHANGER
SAFETY INJECTION PUMPS
AUXILIARY FEEDWATER PUMP * 1B
AUXILIARY FEEDWATER PUMP * 1A
TURBINE DRIVEN AUX. FEEDWATER PUMP
INSIDE CONTAINMENT VESSEL
SHIELD BLDG. WALL
TO AIR COMPRESSORS (SEE M213)
NOT COMPLETE
DCR 2459
NOTES:
1. SEE M758 FOR ADDITIONAL INSTRUMENT ON MAJOR COMPONENTS.
2. ROOT VALVE NUMBERS WILL NOT BE SHOWN ON THIS DRAWING. THE OPERATION VALVE NUMBER CONTAINS THE SYSTEM DESIGNATOR FOLLOWED BY THE INSTR. NO.(i.e., SW-11027).
LEGEND:
NON SV ZONE
SV ZONE
FUNCTIONAL DESCRIPTION DIAGRAM 237127A-M721
WISCONSIN PUBLIC SERVICE CORPORATION
KEWAUNEE NUCLEAR POWER PLANT - UNIT NO. 1
CARLTON, KEWAUNEE COUNTY, WISCONSIN
FLOW DIAGRAM
SERVICE WATER SYSTEM
FLUOR ENGINEERS, INC.
CHICAGO, ILL. 60606
OPERATION M202
OPERATION M202 BR
9209140014-01


ADMIN. BLDG. AIR CONDITIONING & TURBINE BLDG. SAFEGUARD SYSTEM
MOTOR DRIVEN AUX FEEDWATER PUMP 1A FAN COIL
AUXILIARY BUILDING BASEMENT SAFEGUARD COOLING
HRSR REFRIGERATION
CHARGING PUMP 1C FAN COIL
CONTROL ROOM AIR CONDITIONING
AUX. BLDG. AIR CONDITIONING
RESIDUAL HEAT PUMP PIT
AUX. BLDG MEZZ SAFEGUARD COOLING
COMPONENT COOLING PUMP 'B' FAN COIL
DUAL COMPRESSOR CONDENSING UNIT
AS-1 DCR 2396
AM-1 DCR 1922
AM-3 DCR 2459
AM-4 DCR 2459
DCR2396; DCR2459 NOT COMPLETE
SI APERTURE CARD
Also Available On Aperture Card
9209140014-02
WISCONSIN PUBLIC SERVICE CORPORATION
KEWAUNEE NUCLEAR POWER PLANT - UNIT NO. 1
CARLTON, KEWAUNEE COUNTY, WISCONSIN
FLOW DIAGRAM
AIR COND. COOLING WATER PIPING
Pioneer Service & Engineering Co.
WORK THIS DRAWING WITH M202 SHTS. 1, 2, & 3 M202 FLOW DIAGRAM - SERVICE WATER SYSTEM
237127A-M606
OPERATION M606 AT

ATTACHMENT 3

To

Letter from C. A. Schrock (WPSC)

To

Document Control Desk (NRC)

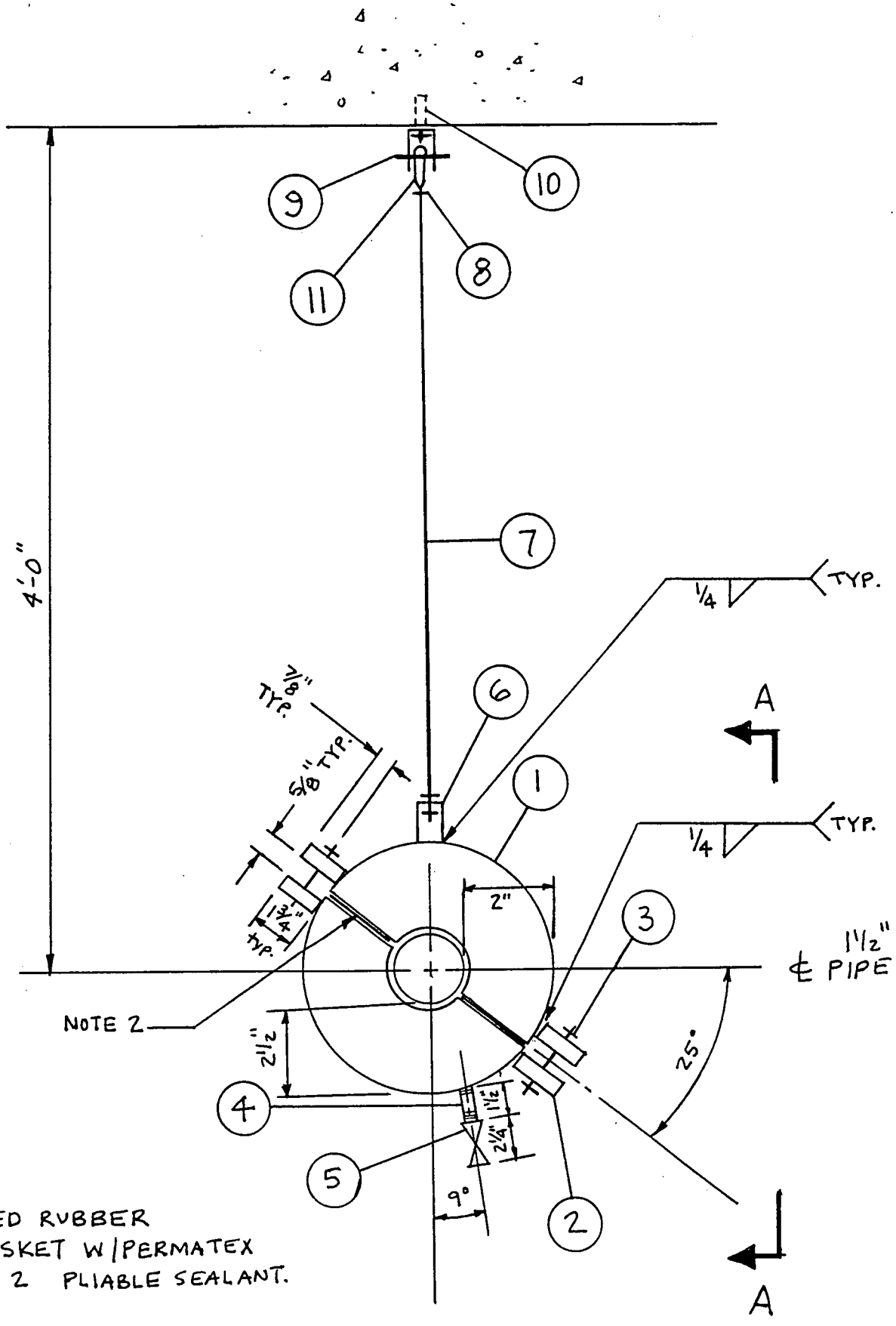
Dated

September 1, 1992

Sketch of Temporary Modification

SKETCH FOR TCR 92-20

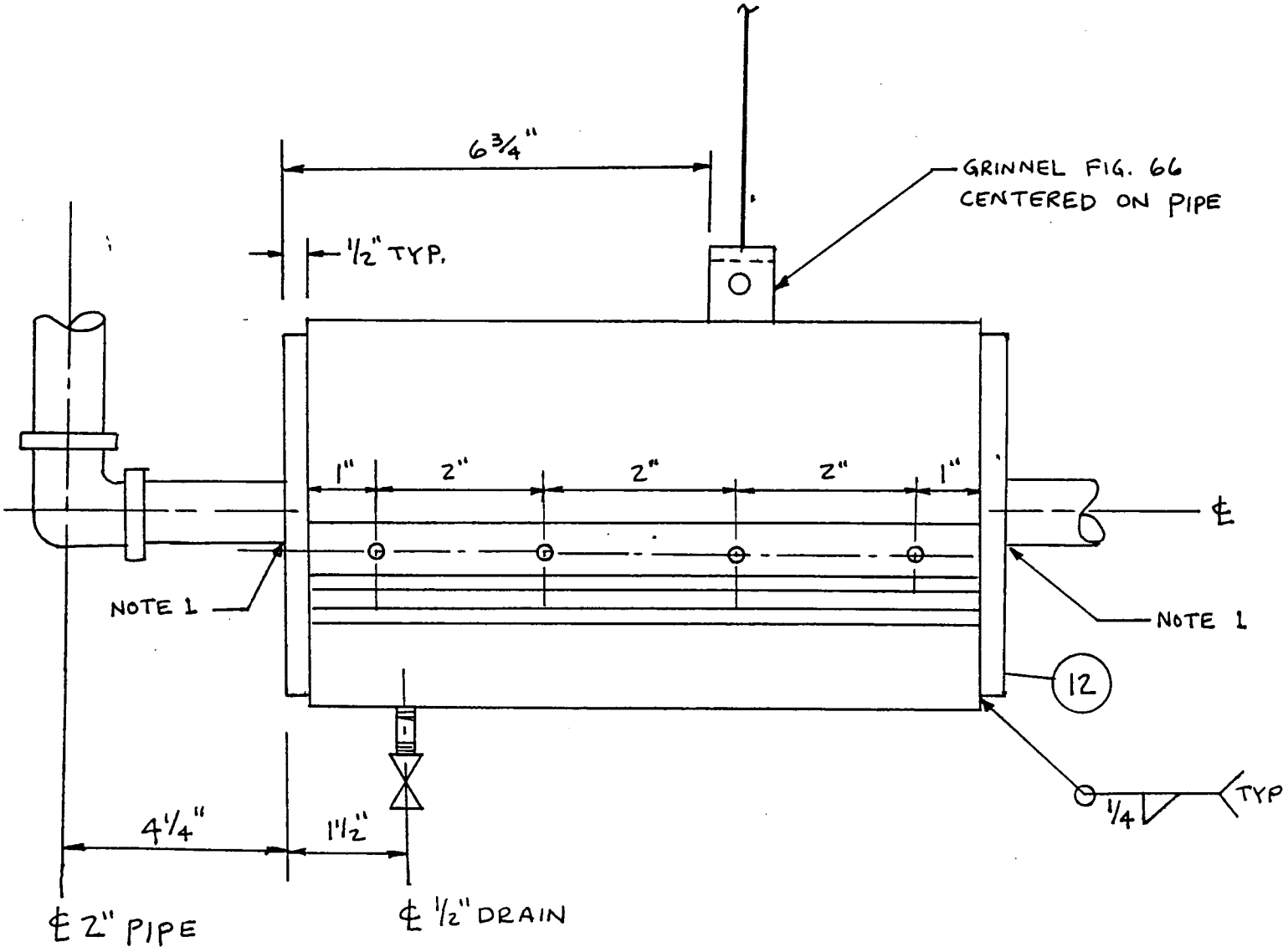
8-31-92



NOTE 2: RED RUBBER GASKET W/PERMATEX NO. 2 PLIABLE SEALANT.

ELEVATION LOOKING NORTH

SKETCH FOR TCR 92-20.



SECTION AA

NOTE: 1 SEALED W/GRAFOIL CORRUGATED TAPE

BILL OF MATERIAL

ITEM	QTY	DESCRIPTION
1	1	6" DIA. PIPE SCH. 80 X 8" LONG.
2	4	1/2" BAR x 1 3/4" x 8" LONG.
3	8	3/8" STUD x 2 1/2" LONG W/NUTS
4	1	1/2" PIPE NIPPLE (SCH. 80) x 1 1/2" LONG.
5	1	1/2" CRANE BRONZE BALL VALVE 600 W.O.G. FIG. 9302
6	2	3/8" GRINNELL FIG. 66
7	1	3/8" THREADED ROD
8	3	3/8" NUT
9	1	1/2" PIN W/ COTTER PINS EACH END
10	1	3/8" HILTI ANCHOR (3" EMBED)
11	1	3/8" GRINNELL FIG. 290
12	1	1/2" PLATE CUT TO FIT